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Information Science and Technology Center Seminar Series

Ilya Safro
Mathematics and Computer Science Division
Argonne National Laboratory

"Multiscale Algorithms for Combinatorial Optimization Problems on Networks"

Wednesday, June 22, 2011
3:00 - 4:00 PM
TA-3, Bldg. 1690 Room 102 (CNLS Conference Room)

Abstract: In many cases, a big scale gap can be observed between micro- and macroscopic scales of problems because of the difference in mathematical (engineering, social, biological, physical, etc.) models and/or laws at different scales. The main objective of multiscale algorithms is to create a hierarchy of problems, each representing the original problem at different coarse scales with fewer degrees of freedom. We will discuss different strategies of creating these hierarchies for combinatorial optimization problems on large-scale networks/graphs/matrices: linear ordering, network compression, partitioning, clustering, cyber attack optimal response, and constrained 2D-layout problem. These strategies are inspired by the classical multigrid frameworks such as Geometric/Algebraic Multigrid and Full Approximation Scheme. We will present in details a framework for designing linear time Algebraic Multigrid based multiscale algorithm for the linear ordering problems. Our multiscale methods have proved themselves to be robust both as a first approximation and as more aggressive optimization solvers.

Joint work with Achi Brandt, Jie Chen, Dorit Ron, and Boris Temkin

Biography: Ilya Safro received his Ph.D. degree from The Weizmann Institute of Science under supervision of Achi Brandt and Dorit Ron, in 2007. He is an Argonne Scholar in the Laboratory for Advanced Numerical Simulations, Mathematics and Computer Science Division, Argonne National Laboratory. Safro was also a CSCAPES Postdoctoral Fellow at ANL.

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For more information contact the technical host Alexander Gutfriend, gutfraind@lanl.gov, 667-8715. If you would like an appointment to speak to Dr. Safro, please contact Josephine Olivas, jojo@lanl.gov, 663-5725.
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